

# Study Guide

# 2-1

## What Is Research?

*For use with textbook pages 35-41*

### Key Terms

- sample** the small group of participants, out of the total number available, that a researcher studies (page 36)
- naturalistic observation** research method in which the psychologist observes the participant in a natural setting without interfering (page 37)
- case study** research method that involves an intensive investigation of one or more participants (page 37)
- survey** research method in which information is obtained by asking many individuals a fixed set of questions (page 38)
- longitudinal study** research method in which data is collected about a group of participants over a number years to assess how certain characteristics change and remain the same during development (page 38)
- cross-sectional study** research method in which data is collected from groups of participants of different ages and compared so that conclusions can be drawn about differences due to age (page 38)
- correlation** the measure of a relationship between two variables or sets of data (page 39)
- hypothesis** an educated guess about the relationship between two variables (page 40)
- variable** any factor that is capable of change (page 40)
- experimental group** the group of participants to which an independent variable is applied (page 40)
- control group** the group of participants that is treated in the same way as the experimental group except that the experimental treatment (the independent variable) is not applied (page 40)

### Drawing From Experience

Have you ever wondered how pollsters can predict who is going to win an election? Have you ever considered how advertisers determine that 9 out of 10 people prefer a certain brand? This section explains the various research methods that psychologists use. It also discusses why psychologists choose a certain method.

### Organizing Your Thoughts

Use the diagram on the next page to help you take notes as you read the summaries that follow. Think about why each type of research is useful to psychologists.

	Naturalistic Observation	Case Studies	Surveys	Longitudinal Studies	Cross-Sectional Studies	Correlations	Experiments
Description	1.	2.	3.	4.	5.	6.	7.
Example	8.	9.	10.	11.	12.	13.	14.

## Read to Learn

### Introduction (page 35)

Jane Goodall observed the behavior of chimpanzees. She used naturalistic observation and case studies to conduct her research. To develop theories, psychologists must gather useful information. Like other scientists, they have developed many methods for gathering and analyzing the information they need.

15. How do the methods used by psychologists to gather information differ from everyday information-gathering methods?
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### Pre-Research Decisions (page 36)

Researchers begin by asking a question. They then make a guess about the answer to their question. This guess is called a **hypothesis**. Then researchers gather evidence to see if their hypothesis is correct. There are many ways to gather information. Researchers might conduct an experiment. They might use case studies. They might use another method of gathering information. The method they use depends upon the question they are trying to answer.

When psychologists study a group of people, the entire group is called a **population**. Psychologists cannot always investigate every member of a population. For example, if psychologists want to know what American high school students think about college, they cannot ask every student in the country. Instead they will study a small group of students who represent all of the students in the country. This small group is called a **sample**.

If psychologists choose their samples carefully, they can get an answer that can be applied to the entire population. To find the correct answer, a sample must be representative of the entire population. For example, if you are studying the average height of American men, you would not study only basketball players.

There are two ways to get samples that represent an entire population. One way is to collect a **random sample**. Random samples give every person in the population an equal chance of being chosen. The second way to get a sample is to collect a **stratified sample**. To collect a stratified sample, psychologists divide the population into subgroups. They then pick out the people they want in the sample. They try to pick people so that every subgroup in the population is represented proportionately.

16. Each week a list is published of the most popular television programs from the previous week. The survey gathers information from a few thousand homes across America. What type of sample is used?
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### Methods of Research (page 37)

Psychologists use many different methods to gather information. To study how people and animals behave in daily life, psychologists use **naturalistic observation**. They watch people or animals in their natural settings without interfering. To acquire detailed information about individuals or groups, psychologists use **case studies**. Case studies do not prove anything about people not studied. They do, however, provide much information psychologists can use to develop experiments. To gather data about the behaviors, attitudes, and experiences of large numbers of people, psychologists use **surveys**. Surveys include interviews, questionnaires, or a combination of the two.

To study how behavior changes over time, psychologists use **longitudinal studies**. They study the same group of people over a long period of time. Longitudinal studies can take too long to conduct. Another way to study changes in behavior over time is to use **cross-sectional studies**. In a cross-sectional study, psychologists study people of different ages.

Often, psychologists want to study the relationship between two sets of observations. This type of study is known as a **correlation**. Correlations compare two things or two sets of data. If a positive correlation exists, the increase (or decrease) in one thing is matched by an increase (or decrease) of the other. For example, people with high IQ scores tend to have high grades as well. If a negative correlation exists, an increase in one thing is matched by a decrease in the other—or vice versa. For example, the more hours you practice tennis, the fewer double faults you have. A correlation simply describes the relationship. It does not prove that one event caused the other.

Many psychologists use experiments to conduct research. Experiments begin with a **hypothesis**. Psychologists then identify the things that are likely to be changed by the experiment. These are called **variables**. An *independent variable* is something researchers change during the experiment. A *dependent variable* is something that changes on its own in response to changes in the independent variable.

Participants in an experiment are divided into two groups called the **experimental group** and the **control group**. The experimental group is exposed to the independent variable. The control group is not exposed to the independent variable. The experimenter then compares the results from the two groups. Other researchers then repeat the experiment and try to replicate the results to make sure no errors were made in the original experiment. Psychologists must meet certain ethical standards in their research. The American Psychological Association (APA) publishes ethical guidelines for researchers to follow.

17. What research method would you use to find out how many people noticed a company's new billboard?
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**Study Guide** **2-2**

**Problems and Solutions in Research**

*For use with textbook pages 42–45*

**Key Terms**

- self-fulfilling prophecy** a situation in which a researcher's expectations influence the researcher's own behavior, and thereby influence the participant's behavior (page 42)
- single-blind experiment** an experiment in which the participants are unaware of which participants received the treatment (page 43)
- double-blind experiment** an experiment in which neither the experimenter nor the participants know which participants received which treatment (page 43)
- placebo effect** a change in a participant's illness or behavior that results from a belief that the treatment will have an effect, rather than the actual treatment (page 45)

**Drawing From Experience**

Have you ever believed strongly that something would happen? Have you ever acted to make sure that something happens? In the last section, you read about the methods psychologists use to conduct research. In this section, you will read about problems that can happen with research.

**Organizing Your Thoughts**

Use the diagram below to help you take notes as you read the summaries that follow. Think about kinds of problems researchers face and the techniques they use to avoid them.

<b>Problems Researchers Face</b>	<b>Possible Solutions</b>
Self-fulfilling prophecies	1.
Deceiving participants	2.
Placebo effect	3.

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**Read to Learn**

**Introduction (page 42)**

When researchers test a hypothesis they expect certain results. If they are not careful, their body language or facial expressions may give the participants clues as to how to behave. This is called a **self-fulfilling prophecy**. Researchers get the results they expect because their behavior tells participants what to do.

4. Describe a time when your behavior influenced the behavior of someone else.
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### **Avoiding Self-Fulfilling Prophecies (page 43)**

Researchers have developed ways to avoid self-fulfilling prophecies. They may use a **single-blind experiment** or a **double-blind experiment**. In a **single-blind experiment**, the participants do not know if they have received the treatment. For a study on the effects of tranquilizers, for example, the participants do not know if they took the tranquilizer or a placebo. The placebo would be a pill that looks like the tranquilizer, but has no medical effects. The researcher knows which participants received the tranquilizer and which received the placebo. When the participants describe the effects of the tranquilizer, the researcher can determine whether the participants' expectations have shaped their responses.

In a **double-blind experiment**, neither the participant nor the researcher knows who is receiving the treatment. This avoids any chance of a self-fulfilling prophecy. Researchers cannot give away information that they do not have.

5. How may a participant's expectations affect the results of an experiment?
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### **The Milgram Experiment (page 44)**

Stanley Milgram conducted a famous **single-blind experiment**. He tested whether people would shock a person simply because an authority figure told them to do it. It was a **single-blind experiment** because Milgram knew the real purpose of the experiment but the participants did not. Although Milgram's experiment supported his hypothesis, many researchers considered his methods unethical. Before experimenting on people today, the American Psychological Association requires its members to give a plan to its Human Participants Committee for approval.

6. Why do you think some psychologists considered Milgram's experiment unethical?
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### **The Placebo Effect (page 45)**

When researchers study drugs they must consider the **placebo effect**. This is a change in behavior due to the belief that the treatment will be effective. In one experiment three groups were studied. One group was told they were receiving a tranquilizer. The second group was told that they were receiving an energizing drug. The control group did not receive any drugs at all. More than half the people in the experimental groups reported benefits from the drugs. All the drugs used in the experiment, however, were placebos. Participants' reactions were due to their expectations, not to actual effects.

7. Why do you think the placebo effect works?
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**Study  
Guide****2-3****Statistical Evaluation**

*For use with textbook pages 47–54*

**Key Terms**

- statistics** the branch of mathematics concerned with summarizing and making meaningful inferences from collections of data (page 48)
- descriptive statistics** the listing and summarizing of data in a practical, efficient way (page 48)
- frequency distribution** an arrangement of data that indicates how often a particular score or observation occurs (page 49)
- normal curve** a graph of frequency distribution shaped like a symmetrical, bell-shaped curve; a graph of normal distribution (page 51)
- central tendency** a number that describes something about the “average” score of a distribution (page 51)
- variance** a measure of difference or spread (page 52)
- standard deviation** a measure of variability that describes an average distance of every score from the mean (page 52)
- correlation coefficient** a statistic that describes the direction and strength of the relationship between two sets of variables (page 52)
- inferential statistics** numerical methods used to determine whether research data support a hypothesis or whether results were due to chance (page 53)

**Drawing From Experience**

Have you ever played on a sports team? What type of statistics did the team keep? What did the statistics tell the coaches about the team members' performances?

In the last section, you explored how to overcome common research problems. In this section, you will learn how researchers organize and evaluate their results. These tools are known as **statistics**.

**Organizing Your Thoughts**

Use the diagram at the top of the next page to help you take notes as you read the summaries that follow. Think about the type of information that you learn from each type of statistic.

Types of Distributions	Measures of Central Tendency	Measures of Variance
1.	3.	6.
2.	4.	7.
	5.	8.

## Read to Learn

### Introduction (page 47)

Psychologists try to collect meaningful data. They then have to organize and evaluate the data correctly. To organize and evaluate the data, psychologists use statistics.

9. How can statistics help you evaluate a hypothesis?

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### Descriptive Statistics (page 48)

Descriptive statistics list and summarize data in useful ways. Tools include tables and graphs. One descriptive statistic is a **frequency distribution**. This table arranges data so that the researcher can quickly see which response was given most often. Percentages may be calculated from the table. For example, a student collects data about the number of hours spent watching TV the night before a big test. The frequency distribution shows that 3 participants watched TV for one hour. Since there were 15 participants, 20 percent of the students surveyed watched TV for one hour on the night before the big test.

Frequency information can also be displayed as a *histogram* or a frequency polygon. A histogram is similar to a bar graph. A frequency polygon plots points by participant and frequency. The points on the graph are then connected to form an irregular shape.

When very large amounts of data are collected, a graph of frequency distribution may produce a bell-shaped curve. This kind of curve is called a **normal curve**. A normal curve is symmetrical. The largest frequency is at the center of the curve.

Three methods psychologists use to summarize information are the *mean*, the *median*, and the *mode*. These are the measures of **central tendency**. They describe something about the average score of a distribution. The mode is the most frequent score. The median is the middle score. It is determined by listing all the scores from lowest to highest. The median score has an equal number of

lower and higher scores. The mean is the mathematical average. To find the mean, you add all the scores then divide by the total number of scores you added.

Distributions vary in ways other than averages. They also vary in how spread out they are. Measures of variance tell how wide or tall the distribution is. Three common measures of variance are the range, the **standard deviation**, and the **correlation coefficient**. The range is the difference between the highest and lowest scores. The standard deviation uses all the data points in its calculation. It is a measure of the distance of each score from the mean. The correlation coefficient describes the strength of the relationship between two sets of data. A *positive correlation* means that as one variable increases, the other variable also increases. A *negative correlation* indicates that as one variable increases, the other variable decreases.

10. What do each of the following measure: mean, median, mode, correlation coefficient, and range?

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### **Inferential Statistics (page 53)**

Psychologists use **inferential statistics** to make generalizations about sets of data. These statistics tell whether the research supports the hypothesis or is simply due to random chance. Probability is the chance that a particular outcome will occur. For example, the chance of a coin landing heads up is 50 percent. This 50 percent chance is the same every time you toss the coin.

Researchers use measures of statistical significance to determine if the results occurred because of chance. These complex tools help researchers rule out the possibility that their results were due to chance. For sets of data that are normally distributed, the researcher uses statistics to verify that their data distribution is not far away from the distribution of a normal curve.

11. Toss a coin 10 times and record the results. What do your results indicate about the likely results of the next toss? Are the results likely due to chance or due to an unfair coin?

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